outputs output data on said communication port, said output data including position data from said at least one position sensor;

determines at least one installed force feedback effect to contribute to output of said force feedback system;

processes said stored force feedback effect to determine a force contribution from said force feedback effect; and

outputs a force feedback value based on said determined force contribution to cause a force based on said force feedback value to be output by said actuator to the user of said force feedback system.

20. A computer mediated control system as recited in claim 19, wherein said force feedback effect is one of a detent effect, a wall effect, and a spring effect.

21. A computer mediated control system as recited in claim 19, wherein said force feedback effect includes at least one parameter, and wherein said at least one parameter is at least one of a stiffness parameter, a damping parameter, a force parameter, and a distance parameter.

22. A computer mediated control system as recited in claim 19, wherein said force feedback value is a result of summing force contributions from a plurality of installed force feedback effects.

23. A computer mediated controller as recited in claim 19, wherein pointers are provided by a user of said force feedback system to install desired force feedback effects to contribute to said

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output force feedback value.

24. A computer mediated controller as recited in claim 19, further comprising computing velocity from said position data received from said at least one position sensor and using said velocity in said determination of said force contribution.

25. A computer mediated controller as recited in claim 19, wherein said force feedback effect contributes to said output force feedback value as a result of a user manipulatable member being moved by a user to enter a boundary of said force feedback effect as determined by said position data.

26. A method as recited in claim 25, wherein said output data includes button press data from at least one button provided on said user manipulatable member of said force feedback system.

27. A force feedback device, comprising:

a user manipulatable member having at least one degree of freedom of motion and being manipulatable by a user physically contacting said member;

at least one actuator outputting forces to said user;

at least one position sensor for determining a position of said user manipulatable member in said at least one degree of freedom;

a computer mediated controller coupled to said actuator and to said at least one position sensor, wherein said controller receives input information through a communication port of said computer mediated controller and decodes commands from said input information;

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reads force values from said communication port, outputs output data on said communication port, said output data including position data from said position sensor;

determines at least one installed force feedback effect to contribute to output of said force feedback system;

processes said installed force feedback effect to determine a force contribution from said installed force feedback effect; and

outputs a force feedback value based on said determined force contribution to cause a force based on said force feedback value to be output by said actuator to the user of said force feedback system.

10. 9
28. A force feedback device as recited in claim 27, wherein said user manipulatable member is a joystick.

11. 9
29. A force feedback device as recited in claim 27, further comprising a deadman switch for disabling said output forces when said user is not manipulating said member.

12 9
30. A force feedback device as recited in claim 27, further comprising a gear transmission provided between said joystick and said plurality of actuators, said gear transmission transmitting said output forces from said actuators to said member.

13. 9
31. A force feedback device as recited in claim 27, wherein a memory is accessible to said software controller.

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14.

32. A force feedback device as recited in claim 31, wherein said memory is non-volatile memory.

15.

33. A force feedback device as recited in claim 27, wherein said force feedback effects include at least one of a detent, a wall, and a spring.

16.

34. A force feedback device as recited in claim 27, wherein each of said force feedback effects includes at least one parameter, and wherein said at least one parameter is at least one of a stiffness parameter, a damping parameter, a force parameter, and a distance parameter.

17.

35. A method for providing output force from an actuator in a force feedback device, the method comprising:

outputting a maximum peak force from an actuator on a user manipulatable object of said force feedback device, wherein a user can manipulate said user manipulatable object in a degree of freedom, and wherein said maximum peak force is related to a maximum power that said actuator can utilize instantaneously; and

reducing said output of said maximum peak force to an output of a nominal peak force from said actuator when said power utilized by said actuator exceeds an average power level over a predetermined period of time, wherein said nominal peak force is related to a maximum power that said actuator can utilize in continuous steady-state operation.

18.

36. A method as recited in claim 35, wherein said maximum peak force is output only when said user initially moves said user manipulatable object into an object simulated by a

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computer system.

19. 17
37. A method as recited in claim 36, wherein said maximum peak force has about twice as great a magnitude as said nominal peak force.

38. A method as recited in claim 36, wherein said nominal peak force is associated with an average current during operation of said actuator.

39. A method as recited in claim 36, further comprising monitoring average power requirements of said actuator over time to determine when said power utilized by said actuator exceeds said average power level over said predetermined period of time.

40. A method as recited in claim 36, wherein said predetermined period of time is about two seconds.

23.
41. A force feedback device that interfaces with a computer graphical simulation, said force feedback device comprising:

a user manipulatable object moveable by a user in at least one degree of freedom;

at least one sensor that detects a position or motion of the user manipulatable object in the at least one degree of freedom; and

at least one actuator outputting a force on the user manipulatable object, the at least one actuator outputting a maximum peak force on the user manipulatable object;

wherein the peak force is related to a maximum power that the at least one actuator can

utilize instantaneously, and wherein the maximum peak force is reduced to a nominal peak force by the actuator when the power utilized by the actuator exceeds an average power level over a redetermined period of time, wherein the nominal peak force is related to a maximum power that the actuator can utilize in continuous steady-state operation.

42. A force feedback device as recited in claim 41, wherein the maximum peak force is output only when the user initially moves the user manipulatable object into an object simulated in the computer graphical simulation.

43. A method as recited in claim 41, wherein the maximum peak force has about twice as great a magnitude as the nominal peak force.

44. A method as recited in claim 41, wherein the predetermined period of time is about two seconds.

45. A method as recited in claim 41, wherein the user manipulatable object is a joystick.--

Respectfully submitted,

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